Here comes our response, in bold text, to the Anonymous Referee #2 comments (we have also inserted the bolded numbers in the referee's initial comment so that we could address each point in order).

The purpose of this paper is not clear and the description on the background of this study is insufficient **(1)**. Why did they try to characterize the spatial variability of range of trace elements **(2)**? Is there any environmental problem in water quality other than acidification **(3)**? The ambiguity of purpose resulted in the difficulty of understanding the scientific meaning and of evaluation for the validity of methodology and statistical analysis. In the chemical analysis, filtration was not conducted before analysis. The authors described some reasons for the use of unfiltered samples, but it was invalid **(4)**. In addition, there was no description on the geology of the catchment areas. It is well known that the water quality, especially in trace elements such as As, is affected by bedrock types. Therefore, geological factors not only soil types should be included to conduct the spatial analysis on water quality **(5)**.

1) We have tried to improve the background of this study both by placing it in the context of earlier studies and emphasizing what is novel in the new study that considers entire drainage networks, including transitions along reaches, at junctions, and when passing lakes.

2) There is an increased awareness about the need to assess trace elements that are being introduced into the environment in increasing quantities. There are few studies that look at relatively remote forest waters to define the concentrations and spatial patterns of trace elements. This study can therefore help establish a baseline against which future changes can be judged, as well as provide insights into the catchment factors and processes influencing the distribution and concentration of trace elements in surface waters.

3) Acidification is the major environmental threat in these areas, but locally there is also eutrophication and hydromorphological changes related to forestry.

4) The filtration process in these humic and iron rich systems can have negative impacts on the concentration of trace elements. There are few sites that had enough inorganic particles in our study to change that. Please see Table 3 on page 14 in Köhler (2010), please note the meaning of the different colours in the table:

"All lab filtered samples may be classified according to their [FM]/[TM] ratio. This analysis allows for distinction between metals occurring mostly in the filtered fraction and those where either (a) a significant fraction is removed during the filtration process or (b) a significant amount of metal is leached from mineral particles or smaller particles with significant metal content influenced the metal content (particle contamination). In order to identify which quantitative effects were observed the results were classified according to a number of percentiles and then colored according to the observed [FM]/[TM] ratio. Yellow and red fields require special attention while both green and white fields are regarded as acceptable.

None of the median fractions of [FM]/[TM] is above unity indicating significant fractions of the metals in particulate form. According to Table 3, the metals may be divided into two classes using the lower 25% of the samples as separation criteria; those with [FM]/[TM] fractions near unity (close to 0.7 or above) in more than 75% of the sampling occasions and those where the fraction in 25% of the samples is close to 0.5 or below."

Table 3: Analysis of frequency of [FM]/[TM] in the whole data set for various metals [#].

	Cu	Zn	Cd	Pb	Cr	Ni
lower 5%	0.64	0.41	0.61	0.22	0.31	0.66
lower 25%	0.84	0.64	0.80	0.45	0.72	0.85
median	0.92	0.82	0.90	0.61	0.86	0.91
upper 75%	1.03	0.94	1.00	0.79	0.93	0.96
upper 95%	1.61	1.32	1.20	0.94	1.00	1.15
	Co	As	V	Mo	Fe	Mn
lower 5%	0.31	0.76	0.43	0.92	0.19	0.18
lower 25%	0.56	0.85	0.67	0.95	0.47	0.41
median	0.72	0.91	0.75	1.00	0.62	0.66
upper 75%	0.91	0.95	0.86	1.03	0.75	0.91
upper 95%	0.99	1.00	0.95	1.10	0.94	1.00

[#] White fields indicate fractions [FM]/[TM] above 1 representative of samples where leaching or particle contamination occurred, green fields indicate fractions [FM]/[TM] between 0.5 and 1, yellow fields indicate fractions [FM]/[TM] between 0.25 and 0.5 and red fields indicate fractions [FM]/[TM] below 0.25. For this dataset samples with metal concentrations below 3*limit of quantification have been removed. This limit has been chosen arbitrarily.

Table 3 on page 14 in Köhler (2010).

Köhler, S., 2010. Comparing filtered and unfiltered metal concentrations in some Swedish surface waters (in English). Report 2010:04, Swedish University of Agricultural Sciences, Uppsala. http://publikationer.slu.se/Filer/Metalsreportfinal.pdf

5) In these till dominated systems the chemistry of the Quaternary soils usually has a much larger impact on stream water chemistry than bedrock geology has. Alas, we do not have access to plentiful Quaternary soil chemistry for these catchments, with median catchment size of 1.9 km^2. That is why geology maps were not included in the analysis.

Liming activity is also an important point to understand the water quality. But, no detail description about when, how, how much of liming was found.

When the sites were limed before the sampling is shown on page 10, Table 2, in Temnerud et al. 2009. The impact off liming on Ca/Mg-ratios also indicates that not many sites were influenced by the liming at the time of sampling (Fölster et al. 2011). These references are added to the manuscript, the Method section.

Tabell 2. Kalkningsuppgifter för vattendragen (Vdr) Anråse å (An), Lugnån (Lu), Danshytteån (Dan) för åren 2005-2007. Getryggsån har inte kalkats under denna period.

Vdr	År	Dos	X-koord	Y-koord	Område	Typ	Metod	Medel	Mg/Ca	Ursprung
An	2005	73	6443884	1274993	14VTMANR019	V	H	Gran kalk	0,013	L
An	2007[a]	221	6445270	1276380	Bredvatten	S	H	KSmjöl	0,017	U
An	2005	35	6439700	1274620	Koltjärn	S	H	KSmjöl	0,017	U
An	2007[a]	21	6441400	1276820	Mörtevatten	S	H	KSmjöl	0,017	U
An	2007[b]	7	6436790	1275610	Övre Snäcksjön	S	H	KSmjöl	0,017	U
Lu	2006	174	6331510	1439060	Asasjön	S	B	KSmjöl	0,014	I & U
Lu	2005	28	6338690	1432030	Gårdsjön	S	H	KSmjöl	0,014	I & U
Lu	2005	77	6341940	1435950	Hacksjön	S	H	KSmjöl	0,014	I & U
Dan	2006	24	6627410	1457700	Acksjön	S	H	KSmjöl	0,125	G
Dan	2006	210	6625540	1453950	Dammsjön	S	B	KSmjöl	0,125	G
Dan	2006	226	6624740	1456000	Gränsjön	S	B	KSmjöl	0,125	G
Dan	2006	14	6626680	1459510	Rösjön	S	H	KSmjöl	0,125	G
Dan	2006	4	6624450	1458900	Valsjön	S	H	KSmjöl	0,125	G

Dos är mängden ton kalk per år. Index a är 2007-07-30 och b är 2007-07-31. V är att kalken sprids på våtmark och S är på sjö. H är att kalken sprids via helikopter och B är via båt. Gran kal är Granulerad kalk och KSmjöl är Kalkstensmjöl <0,2 mm. L är Lägerdorf (Tyskland), U för Uddagården, I för Ignaberg och G för Gåsgruvan.

Table 2 on page 10 in Temnerud et al. 2009. River Anråse å is 'An', River Lugnån is 'Lu', River Danshytteån is 'Dan' and River Getryggsån was not limed during the covered period of 2005-2007 in the table.

Temnerud, J., Fölster, J., Pilström, F. and Bishop, K., 2009. Synoptical sampling of small watercourses in southern Sweden in October 2007 (in Swedish). Report 2009:6, Department of Aquatic Science and Assessment, Uppsala. http://publikationer.slu.se/Filer/Rapport2009-6.pdf

Fölster, J., Köhler, S., von Brömssen, C., Akselsson, C. and Rönnback, P., 2011. Correction of water chemistry for liming effect. Selection of references and calculation of uncertainties (in Swedish with an English summary). Report 2011:1, Swedish University of Agricultural Sciences, Uppsala. http://publikationer.slu.se/Filer/Rapport20111CaMg.pdf

As mentioned above, some important information for evaluation of the scientific meaning of this paper was lacked. Then, I recommend the authors to reconstruct the contents with a clear purpose for this research.

As mentioned in our introductory remarks on the comments of Reviewer #2, we have tried to improve the background of this study both by placing it in the context of earlier studies and emphasizing what is novel in the new study that considers entire drainage networks, including transitions along reaches, at junctions, and when passing lakes.